CLAIMS

1. A two-stroke cycle engine using a preceding air-layer for scavenging, comprising:

an exhaust port on the side of the cylinder;

a scavenging port on the side of the cylinder;

a fuel passage, which supplies fuel-air mixture to the crank chamber through the intake port on the side of the cylinder during the time of the elevation of the piston;

an air passage, which supplies scavenging air from the air cleaner towards the inner side of said engine;

an insulator, in which said fuel passage and said air passage run in parallel;

a non-return valve, which is provided on said insulator facing towards the inner side of said engine, to allow the scavenging air to flow only towards the inner side of said engine;

a pair of branching air passages to connect an air supply chamber provided at the inner side of said non-return valve and a branching scavenger passage opened to said scavenging port, which are provided within the wall of the cylinder: and

a pair of scavenger passages, one end of which is connected to said scavenging port, and another outlet end of which is opened to the crank chamber, said pair of scavenger passages are provided within the wall of the crankcase.

2. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 1, wherein the end surface of said outlet end of said scavenger passage in the crankcase forms right angles with respect to the axis of the crankshaft, and a microscopic gap is created between

said end surface of said outlet and the end surfaces of the crank webs which are perpendicular to the crankshaft, which constitutes disk valves, as the opening area of said outlet of said scavenger passage varies as the crank webs rotate.

3. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 2, wherein said opening area of said outlet of said scavenger passage is formed so that said opening area opens more with the rotation of the crank webs as said opening area uncovered by the crank web grows larger.

4. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 1, wherein said branching air passages and said branching scavenger passages formed on either side of the cylinder are surrounded by virtually parallel walls which run in the same direction.

5. A two-stroke cycle engine using a preceding air-layer for scavenging, comprising:

an exhaust port on the side of the cylinder;

a scavenging port on the side of the cylinder;

an intake port on the side of the cylinder fuel passage, which supplies fuel-air mixture through a mixture control valve on the carburetor to the crank chamber during the time of the elevation of the piston;

a scavenger passage opened to said scavenging port;

an air supply port, which supplies scavenging air from the air cleaner to said scavenger passage;

a cam which is interlocked with said mixture control valve;

a cam follower which engages with said cam; and

an air control valve in the upstream of an air passage which controls the diameter of said air passage, and said

air control valve being operated by said cam and said cam follower in such a way as to supply a quantity of scavenging air proportional to the quantity of fuel-air mixture determined by the opening of said cam and the mixture control valve to control the fuel-air mixture.

6. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 5, wherein said air control valve comprises a valve seat midway along the air passage and an umbrella-type valve which can be attached to or removed from said valve seat and which opens and closes said air passage, said cam is fixed to the rotary shaft of said mixture control valve, said cam is configured with an inner cam which is formed on the inside of the edge at a given height raised up on the outer side along the circumference so that, if a spring exerts force in the direction which closes said air control valve, when the edge of said inner cam engages with said cam follower, the operation of said mixture control valve for the fuel-air mixture is transmitted to said air control valve, and said operation opens the air control valve against the force of the spring.

7. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 5, wherein said air control valve comprises a valve seat midway along the air passage and an umbrella-type valve which can be attached to or removed from said valve seat and which opens and closes said air passage, said cam is fixed to the rotary shaft of said mixture control valve, said cam is configured with an inner cam which is formed on the inside of the edge at a given height dropped down on the outer side along the circumference so that, if a spring exerts force in the direction which closes said air control valve, when the

edge of said inner cam engages with said cam follower, the operation of said mixture control valve for the fuel-air mixture is transmitted to said air control valve, and said operation opens the air control valve against the force of the spring.

8. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 5, further comprising an insulator which is fixed to the side of the cylinder, said insulator being provided with said intake port for the fuel-air mixture and said air supply port for scavenging air provided downstream from said air control valve, both of said ports facing towards the same direction, and an air supply passage to said intake port facing towards the same direction.

9. A two-stroke cycle engine using a preceding air-layer for scavenging, comprising:

an exhaust port on the side of the cylinder;

a scavenging port on the side of the cylinder;

a fuel passage, which supplies fuel-air mixture to the crank chamber through the intake port on the side of the cylinder during the time of the elevation of the piston;

a scavenger passage to be connected to said scavenging port;

an air passage, which supplies scavenging air from the air cleaner toward the inner side of said engine;

an insulator, in which said fuel passage and said air passage run in parallel;

a non-return valve, which is provided on said insulator facing toward the inner side of said engine, to open or close said air passage by means of the negative pressure in said scavenger passage; and

a connecting passage with a small diameter to link

said air passage and said fuel passages so that negative pressure in said air passage forces the fuel-air mixture in said fuel passage into said air passage.

10. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 9, wherein said connecting passage links said air passage at a point downstream from said non-return valve and said fuel passage.

11. A two-stroke cycle engine using a preceding air-layer for scavenging according to claim 9, wherein said connecting passage links said air passage at a point upstream from said non-return valve and said fuel passage.

12. A two-stroke cycle engine, comprising:

a scavenger passage which connects a scavenging port on the side of the cylinder to the crank chamber inside the crankcase, and goes through the mounting surface where the cylinder and crankcase are attached to each other; and

a removable guide with a surface forming a curved smooth channel which is attachable to said scavenger passage in the crankcase from the mounting surface, and forms a portion of said scavenger passage with the curved channel.

13. A two-stroke cycle engine according to claim 12, wherein said removable guide comprises a positioning tooth which engages with the hole in the gasket for the mounting surface where the cylinder and crankcase are attached to each other.

14. A two-stroke cycle engine according to claim 12, wherein said removable guide is fixed to the crankcase when a tooth engages in an indentation in the crankcase.

15. A two-stroke cycle engine according to claim 12, wherein said removable guide has a depression in the mounting surface where the cylinder and crankcase are

attached to each other.

16. A two-stroke cycle engine according to claim 12, wherein said removable guide is painted on.

17. A two-stroke cycle engine, comprising:

an exhaust port on the sidewall of the cylinder, which opens into the cylinder;

a scavenging port on the sidewall of the cylinder positioned a slight distance apart in the circumferential direction from said exhaust port, which also opens into the cylinder;

an intake port, which opens to supply fuel-air mixture to the crankcase according to the action of the piston; and

a scavenger passage, which connects the crankcase and said scavenging port;

wherein a blow-up angle (α) of said scavenger passage, which is defined by an angle between the upper wall which connects to said scavenging port and a perpendicular line to the axis of the cylinder, varies along the circumferential direction of the cylinder, and if said blow-up angle in a location nearer said exhaust port is defined as ($\alpha 1$) and said blow-up angle in a location nearer said intake port is defined as ($\alpha 2$), then $\alpha 1 < \alpha 2$.

18. A two-stroke cycle engine according to claim 17, wherein said blow-up angle α varies continuously from a location nearer intake port ($\alpha 2$) to said blow-up angle nearer exhaust port ($\alpha 1$).

19. A two-stroke cycle engine according to claim 17, wherein said blow-up angle α varies in step fashion from a location nearer intake port ($\alpha 2$) to said blow-up angle nearer exhaust port ($\alpha 1$).

20. A two-stroke cycle engine, comprising:

a scavenging port on the side of the cylinder, which

opens into the cylinder; and

a scavenger passage, which connects the crank chamber in a crankcase and said scavenging port, and supplies the fuel-air mixture in the crank chamber to said scavenging port;

wherein said crankcase is configured in such a way that the front and rear portions, which are separated by a block at a right angle to the crankshaft which entails the axis of the cylinder, are fixed to each other by mounting hardware, a scavenger passage is provided inside both said front and rear portions of said crankcase, and the cylinder, whose scavenger passage connects to said scavenger passage in said crankcase, is fixed by mounting hardware to the mounting surface on the top of said crankcase in such a way that said scavenger passage runs through the mounting surface.

21. A two-stroke cycle engine according to claim 20, further comprising an air passage which supplies air from an air cleaner to said scavenger passage is formed inside the cylinder, and connects to the middle portion of said scavenger passage inside the cylinder.

22. A two-stroke cycle engine according to claim 20, wherein a pair of scavenging ports are provided along the circumference of the cylinder, a pair of scavenger passages runs from the outlets in the crank chamber to the scavenging ports, said pair of scavenger passages run through the block separating the halves of the crankcase, and they should be arranged symmetrically along the front-to-rear dimension of the engine.

23. A two-stroke cycle engine, comprising:

a scavenger passage which connects the crankcase and the scavenging port on the side of the cylinder;

an air passage connected to the midpoint of the scavenger passage, which supplies scavenging air from an air cleaner to the scavenger passage; and

a fuel passage, which supplies the fuel-air mixture produced in the carburetor to the crankcase;

wherein said air cleaner has two air passages running from it in parallel, the first one is connected to said air passage, and the second one is connected to the air inlet of the carburetor to provide air for said fuel passage, and a choke valve on the air cleaner is provided to open and close both of said first and second air passages.

24. A two-stroke cycle engine according to claim 23, wherein said choke valve comprises a rotary valve which, when rotated, opens or closes the inlets of said first and second air passages, and a knob by which said valve can be rotated.

25. A two-stroke cycle engine according to claim 24, wherein a choke of said choke valve engages with the case of said air cleaner in such a way that it is free to rotate, the flat surface of said choke comprises a sheet which covers or uncovers the inlets of said first and second air passages, a sealing ring consisting of an elastic material presses the flat surface of said choke against the openings of the inlets by elastic force and forms a fluid seal around the valve shaft with respect to the case, a tapered protrusion is formed on the flat surface of the case of said air cleaner, when the rotary knob of said choke valve strikes the protrusion, then the flat surface of the valve is pressed against the opening of either the first or the second of the two air passages.

26. A two-stroke cycle engine, comprising:

a rotary valve installed on the case in such a way

that it is free to rotate which, when rotated, opens and closes the two air passages; and

a rotary knob which operates the valve;

wherein the front surface of said rotary valve comprises a sheet which covers or uncovers the inlets of the two air passages, a sealing ring consisting of an elastic material presses the flat surface of the valve against the openings of the inlets by elastic force and forms a fluid seal around the valve shaft with respect to the interior of the case.

27. A two-stroke cycle engine with a scavenger passage which connects the crankcase and the scavenging port on the side of the cylinder, which opens into the cylinder and supplies the fuel-air mixture in the crankcase to the scavenging port, wherein said scavenger passages run in both the crankcase and the cylinder, the front and rear portions of the crankcase, separated by a block at a right angle to the crankshaft, which entails the axis of the cylinder, are fixed to each other at the block surface by mounting hardware to form a unitary crankcase, and the cylinder, whose scavenger passage connects to that in the crankcase, is fixed by mounting hardware to the mounting surface at the top of the crankcase.